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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/634,280	08/05/2003	Neal B. Lesh	MERL-1481	7122
22199	7590	09/04/2007		
MITSUBISHI ELECTRIC RESEARCH LABORATORIES, INC. 201 BROADWAY 8TH FLOOR CAMBRIDGE, MA 02139			EXAMINER LEWIS, ALICIA M	
			ART UNIT 2164	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/634,280

Applicant(s)

LESH ET AL.

Examiner

Alicia M. Lewis

Art Unit

2164

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119


- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

  
**SAM RIMELL**  
**PRIMARY EXAMINER**

### DETAILED ACTION

This office action is responsive to communication filed June 11, 2007. Claim 1 is currently amended. Therefore claims 1-8 and 10-13 are pending in this application.

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-7 and 10-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 has been amended to recite, "storing the improved solution result in a memory." Page 5, paragraph 23, of applicant's specification states that modifying and placing steps are repeated until a best solution is selected or a predetermined number of iterations is reached. There is not mention of storing or saving the result in this paragraph or any other paragraph of the specification. Furthermore, Figure 2 ends with step 240, which is the step of selecting a best solution,  $S_b$ . Therefore the storing step represents a new limitation that does not appear in the specification or drawings, and thus constitutes new matter.
3. Claims 2-7 and 10-13 are rejected as being dependent on claim 1.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' Admitted Prior Art (AAPA) in view of Hara et al. (US Patent 5,568,381) ('Hara').

With respect to claims 1 and 8, AAPA teaches:

applying a priority algorithm in a form of an ordering function to an instance of the combinatorial optimization problem to produce an initial solution including an ordering of the elements (elements 110 and 103 in Figure 1);

applying a placement function to map values to the corresponding elements of the ordering (element 120 in Figure 1).

AAPA does not teach modifying the ordering of the elements of the initial solution to produce a re-ordering of the elements; and repeating the modifying and the applying until all elements have been placed to obtain an improved solution of the combinatorial optimization problem, and storing the improved result in a memory.

Hara teaches a combinatorial optimization system that extracts an undesirable relationship from a present solution (see abstract) in which he teaches:

modifying the ordering of the elements of the initial solution to produce a re-ordering of the elements (Figures 1A-B, 9A-B and 10A-B, column 2 line 57 – column 3 line 5, column 7 lines 1-45); and

repeating the modifying and the applying until all elements have been placed to obtain an improved solution of the combinatorial optimization problem (Figures 9A-B, 10A-B, column 3 lines 4-5, 53-58, column 5 lines 24-28), and storing the improved result in a memory (column 2 line 64 – column 3 line 3).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified AAPA by the teaching of Hara because modifying the ordering of the elements to produce a re-ordering of the elements; and repeating the modifying and the applying until all elements have been placed to obtain an improved solution of the combinatorial optimization problem would enable a shortened amount of time required for improvements in solving NP hard combinatorial optimization problems by reducing the number of neighborhoods. It would also enable the ability to obtain a global optimum solution without resulting in a local optimum solution (Hara, column 3 lines 20-23).

With respect to claim 3, AAPA as modified teaches in which the priority algorithm is dynamic (AAPA, paragraph 8 lines 6-7).

5. Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' Admitted Prior Art (AAPA) in view of Hara et al. (US Patent 5,568,381)

('Hara') as applied to claims 1, 3 and 8 above, and further in view of Angelopoulos et al., "On the Power of Priority Algorithms for Facility Location and Set Cover," APPROX, pp 26-39, 2002 ('Angelopoulos').

With respect to claim 2, AAPA as modified teaches claim 1.

AAPA as modified does not teach in which the priority algorithm is fixed.

Angelopoulos teaches priority algorithms (see abstract) in which he teaches in which the priority algorithm is fixed (page 27 lines 9-11).

It would have been obvious to a person having ordinary skill in the art to have further modified AAPA by the teaching of Angelopoulos because a priority algorithm that is fixed would enable a predetermined ordering of values, which would not change throughout execution of the algorithm (Angelopoulos, page 27 lines 9-11).

6. Claims 4, 5, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' Admitted Prior Art (AAPA) in view of Hara et al. (US Patent 5,568,381) ('Hara') as applied to claims 1, 3 and 8 above, and further in view of Krishnan et al. (US Patent Application Publication 2003/0051165 A1) ('Krishnan').

With respect to claims 4 and 10, AAPA as modified teaches claims 1 and 3.

AAPA as modified does not teach in which the re-ordering is within a predetermined distance of the ordering.

Krishnan teaches adaptive re-ordering of data packet filter rules (see abstract), in which he teaches in which the re-ordering is within a predetermined distance of the ordering (paragraphs 33-34).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have further modified AAPA by the teaching of Krishnan because in which the re-ordering is within a predetermined distance of the ordering would enable a better-performing, rule-based operation (Krishnan, paragraph 8 lines 12-14).

With respect to claims 5 and 11, AAPA as further modified teaches in which the distance is a Kendall-tau distance (Krishnan, paragraph 34).

7. Claims 6 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' Admitted Prior Art (AAPA) in view of Hara et al. (US Patent 5,568,381) ('Hara') as applied to claims 1, 3 and 8 above, and further in view of Beygelzimer et al. (US Patent Application Publication 2002/0161736 A1) ('Beygelzimer').

With respect to claims 6 and 12, AAPA as modified teaches claims 1 and 3.

AAPA as modified does not teach in which the re-ordering uses a decision vector, and in which the decision vector has one field for each element of the order, each field determining a new order of the element in the re-ordering.

Beygelzimer teaches systems and methods for using continuous optimization for ordering categorical data sets (see abstract), in which he teaches in which the re-ordering uses a decision vector, and in which the decision vector has one field for each element of the order, each field determining a new order of the element in the re-ordering (Beygelzimer, paragraph 53).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have further modified AAPA by the teaching of Beygelzimer because the re-ordering uses a decision vector, and in which the decision vector has one field for each element of the order, each field determining a new order of the element in the re-ordering would enable the formulation of the ordering problem in a fundamentally different way, which would avoid intractable combinatorial formulations (Beygelzimer, paragraph 29).

8. Claims 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' Admitted Prior Art (AAPA) in view of Hara et al. (US Patent 5,568,381) ('Hara') as applied to claims 1, 3 and 8 above, and further in view of Lesh et al. (US Patent Application Publication 2004/0167661 A1) ('Lesh').

With respect to claims 7 and 13, AAPA as modified teaches claims 1 and 3.

AAPA as modified does not teach in which the re-ordering is probabilistic.

Lesh teaches a method for packing rectangular strips (see abstract) in which he teaches in which the re-ordering is probabilistic (paragraph 72).



It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have further modified AAPA by the teaching of Krishnan because in which the re-ordering is probabilistic would enable the selection of decision vectors at each step randomly according to a probability distribution (AAPA, paragraph 43).

### ***Response to Arguments***

9. Applicant's arguments filed June 11, 2007 have been fully considered but they are not persuasive. Applicant argues that Hara's improved solution does not have the same set of elements, and that Hara instead offers a neighbor solution, which is disjoint. Examiner disagrees. Applicant's specification pages 5-6, paragraphs 25 and 26, state that there are often 'nearby' solutions that are better solutions and the modification or re-ordering is used to provide such solutions. Hara's neighbor solutions may be considered 'nearby' solutions as well. Applicant's statement that the neighbors are disjoint is mere allegation.

10. Hara teaches 4-jobs, 3-machines job shop problem in Figures 1A and 1B. Figures 9A and 9B show an initial solution to the problem defined in Figure 1. Figures 10A and 10B show an improved solution to the initial solution of Figures 9A and 9B. All figures, 9A, 9B, 10A and 10B, have the same elements. Thus, Hara does in fact teach re-ordering elements to obtain an improved solution having the same set of elements.

11. Applicant further argues that Krishnan has nothing to do with optimization problems, the reference does not reorder elements of an instance of a solution of an

optimization problem, and that the reference does not teach reordering according to a predetermined distance of the ordering. Krishnan has not been used to teach reordering elements of an instance of a solution of an optimization problem. Krishnan has only been relied upon to teach wherein the reordering of elements is within a predetermined distance, as he teaches in paragraphs 34 and 34. Krishnan teaches that a bubble sort algorithm is used to perform the reordering, thus it is inherent that a reordering is within a bubble-sort distance. It is well known in the art that a bubble-sort algorithm uses a bubble-sort distance. AAPA as modified teaches reordering elements of an instance of a solution of an optimization problem, thus the combination of AAPA, Hara and Krishnan teaches wherein the reordering of elements is within a predetermined distance.

12. In response to applicant's argument that Krishnan is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the reference is pertinent to the problem with which the applicant was concerned, using algorithms for ordering/reordering elements. Although Krishnan's reordering algorithm is used for a different purpose, it is still a reordering algorithm and can be used to solve the problem of using algorithms for reordering elements.

13. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies

(i.e., a decision vector having elements, which encompasses the overall strategy for obtaining solutions to real-time optimization problems) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

14. Lastly, applicant argues that Lesh does not teach a reordering that is probabilistic. Lesh teaches a probability of obtaining a particular reordering. If applicant has interpreted the term "probabilistic" to mean something else, examiner suggests defining the term as he wishes it to be interpreted.

### ***Conclusion***

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alicia M. Lewis whose telephone number is 571-272-5599. The examiner can normally be reached on Monday - Friday, 9 - 6:30, alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Rones can be reached on 571-272-4085. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alicia Lewis  
August 21, 2007

  
SAM RIMELL  
PRIMARY EXAMINER